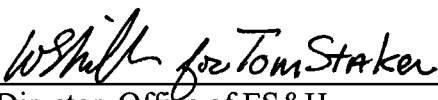



U.S. Department of Energy	Subject: Fire Protection Inspection Criteria, Approach, and Lines of Inquiry	HS: HSS CRAD 64-34 Rev: 0 Eff. Date: 09/22/2009
Office of Independent Oversight	 Director, Office of ES&H Evaluations  Date: 9/22/2009	
Criteria Review and Approach Document	 Criteria Lead, Fire Protection  Date: 9/22/2009	Page 1 of 9

## 1.0 PURPOSE

Within the Office of Independent Oversight, the Office of Environment, Safety and Health (ES&H) Evaluations' (HS-64) mission is to assess the effectiveness of those environment, safety and health systems and practices used by field organizations in implementing Integrated Safety Management (ISM) and to provide clear, concise, and independent evaluations of performance in protecting our workers, the public, and the environment from the hazards associated with Department of Energy (DOE) activities and sites.

A key to success is the rigor and comprehensiveness of our process; and as with any process, we continually strive to improve and provide additional value and insight to field operations. Integral to this is our commitment to enhance our program. We continue to make them available for use by DOE line and contractor assessment personnel in developing and implementing effective DOE oversight and contractor self-assessment and corrective action processes; the current revision is available at <http://www.hss.energy.gov/IndepOversight/ESHE/docs.html>

This document will be used to collect information to assess the fire protection area. Attention will be given to on-site activities governed by DOE Order 420.1B, National Fire Protection Association (NFPA) codes and standards, and implementation guides 420.1 and 440.1 Fire Safety Program to the extent to which these documents are required by contract.

Necessary reviews of policies, procedures, and written programs will ensure that fire programs have been implemented to meet the DOE's objectives for minimizing the potential for the occurrence of a fire or related event causing an unacceptable onsite or offsite release of

hazardous or radiological material, property loss limits or damage critical process controls and safety class systems, structures and components.

## **2.0 APPLICABILITY**

The following Inspection Criteria document is approved for use by the Office of ES&H Evaluations.

## **3.0 FEEDBACK**

Comments and suggestions for improvements on these Inspection Criteria, Approach, and Lines of Inquiry can be directed to the Director of the Office of ES&H Evaluations on (301) 903-5392.

## **Fire Protection Inspection Criteria, Approach, and Lines of Inquiry**

There are three major assessment areas including Programmatic Elements, Physical Features, and Administrative Features. The following are typical inspection activities that will apply to all of the Inspection Criteria listed below and will be performed to collect information during the assessment.

**Inspection Activities:** Review fire protection system design and defense in-depth strategies. Interview personnel including fire engineers, fire coordinators, fire system technicians, and fire department personnel. Review policies, procedures, and corresponding documentation related to ISM core function and Nuclear Safety.

**Inspection Activities:** Perform facility building walk downs and inspections, and observe selected work activities, such as hot work, storage, and dispensing flammable liquids, and response to facility fire drills.

### **Programmatic Elements**

A policy statement incorporates fire protection requirements, staff organization, training and the responsibilities for design, installation, operability and ITM requirements. Fire protection requirements shall be documented including plans and specifications for new facilities and significant modification to existing facilities. Examples of documentation should include specifications, procedures, and acceptance tests by a qualified fire protection engineer.

Fire hazards shall be documented using a graded approach for all hazard category 1, 2, and 3 nuclear facilities, significant new facilities and those representing a unique fire safety risk as determined by the Authority Having Jurisdiction (AHJ). Conclusions should be incorporated into the Design Safety Analysis and integrated into the design basis and accident analysis. Exemption, equivalencies, and variances for such buildings should be documented with appropriate corrective actions plans.

The Fire Protection program includes requirements for the use and storage of combustible, flammable, radioactive and hazardous materials that minimize the risk from fire, fire protection system impairments, smoking and hot work, safety operation of process equipment and prevention measures to decrease the risk of fire. Formal assessments shall be completed and documented based on the monetary value of the facilities and the respective frequency.

### **Inspection Criteria**

The program requirements for fire prevention and life safety inspections including those for housekeeping practices, transient combustibles, liquids and solids, flammable/combustible liquids, compressed gases and means of egress meets recognized standards (Ref. NFPA 1 Fire Prevention Code and NFPA 101 Life Safety Code).

### **Inspection Lines of Inquiry**

- Are facility life safety walk downs being completed and fire hazards are being identified and corrected?
- Are means of control such as completed facility inspections, established limits of combustibles, maintenance of emergency light/exit signs, safe storage, and separation of compressed gases completed?
- Do facility inspections and/or checklists provide adequate guidance for identification of deficiencies and prioritizing of findings?
- Are flammable liquid storage cabinets (Underwriters Laboratories, Inc./Factory Mutual) approved with approved means of venting and grounding?
- Are hazards associated with the storage of compressed gases and flammable liquids labeled to meet NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response?

### **Inspection Criteria**

The program requirements for flammable/combustible liquid storage, handling and transferring of flammable/combustible liquids, handling of compressed and liquefied gases and handling of aerosol containers meets recognized standards (Ref. NFPA 30 Flammable and Combustible Liquids, NFPA 45 Fire Protection for Laboratories Using Chemical, NFPA 54 National Fuel Gas Code and NFPA 58 Storage and Handling of Liquefied Petroleum Gases).

### **Inspection Lines of Inquiry**

- Are compressed gases and liquids safely stored?
- Are compressed gases and flammable liquids safely handled and dispensed?
- Do facility procedures comply with requirements for storage, handling and dispensing of flammable liquids and compressed gases?

### **Inspection Criteria**

The adequacy of hot work has been evaluated including fire watch, fire patrols program, permitting, site preparations, inspections, and close out (Ref. NFPA 51B Standard for Fire Prevention and Use of Cutting and Welding Processes).

### **Inspection Lines of Inquiry**

- Are work practices followed by workers performing hot work and by assigned fire watches?
- Do site preparation and restoration of work areas meet hot work permit requirements?
- Do fire protection coordinators and fire protection engineers understand provisions of the hot work program?

### **Inspection Criteria**

The adequacy of the control of transient combustibles program including the storage and handling meets recognized standards.

### **Inspection Lines of Inquiry**

- Does combustible loading meet or exceeds the level of risk and comply with the fire hazards analysis?
- Have administrative controls been implemented for managing transient combustibles?

### **Inspection Criteria**

The adequacy of the fire impairment program including compensatory actions, planned and unplanned impairments, emergency notifications and restoration meets recognized standards (Ref. NFPA 13 Standard for the Installation of Sprinkler Systems, NFPA Standard for the Installation of Centrifugal Fire Pumps, NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances, and NFPA 72 National Fire Alarm Code).

### **Inspection Lines of Inquiry**

- Do impairment permits and impairment logs specify appropriate active impairments and associated compensatory actions?
- Do notification and restoration requirements for responding to a fire alarm, supervisory and trouble conditions meet NFPA 72, National Fire Alarm Code?
- Are facility Abnormal Operating procedures (AOP's), Emergency Operating procedures (EOP's) and Alarm Response procedures (ARP's) clear and consistent?
- Have procedure reviews been conducted and documented by a qualified fire protection engineer?
- Is there a means of isolation during impairment of sprinkler systems and fire mains? Does the level of safety fulfill the requirements for a highly protected risk (HPR) status?

### **Inspection Criteria**

The adequacy of the fire extinguisher program including completing inspections and performing routine maintenance meets recognized standards (Ref. NFPA 10 Standard for Portable Fire Extinguishers).

### **Inspection Lines of Inquiry**

- Are fire extinguishers readily accessible, adequately spaced, and meet the respective hazard/application?
- Do facility training records indicate that occupants are trained for incipient fire response?
- Are ITM records for fire extinguishers in accordance with NFPA 10, Standard for Portable Fire Extinguishers requirements?

### **Inspection Criteria**

The adequacy and installation of emergency lighting and exit signage is acceptable. Operability of equipment is essential to ensure safe exiting for occupants in accordance with Life Safety recommendations (Ref. NFPA 101, Life Safety Code and NFPA 70, National Electric Code).

### **Inspection Lines of Inquiry**

- Are both the functional checks and the 90-minute load tests being completed and documented in monthly and annual ITM reports?
- Is emergency lighting for safe egress of occupants during loss of power conditions?
- Is exit signage adequate for occupant exiting?

### **Inspection Criteria**

A policy statement incorporates the fire protection requirements, related DOE directives, and standards.

**Inspection Lines of Inquiry**

- Has management demonstrated a commitment for the implementation of a fire protection program as stated in an approved policy statement that meets DOE Order 420.1B?

**Inspection Criteria**

Site requirements for staffing, training, installation, operability, design and ITM have been documented and implemented.

**Inspection Lines of Inquiry**

- Do records of annual flow and fire pump tests indicate adequate and reliable water supplies are available for property protection?
- Do personnel performing ITM and post maintenance on fire protection systems meet the NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems and NFPA 72, National Fire Alarm Code requirements?
- Has the fire protection staff been trained in accordance with DOE Order 420.1B?

**Inspection Criteria**

The facility has access to qualified and trained fire fighting personnel.

**Inspection Lines of Inquiry**

- Have appropriate training and qualification requirements for firefighting personnel?

**Inspection Criteria**

Adequate documentation is in place for facilities including plans, specifications, procedures, acceptance tests, design basis, fire hazard analysis and alternative means for meeting DOE requirements (i.e., exemptions, equivalencies and waivers). The graded approach (fire hazard analysis/documented safety analysis (FHA/DSA)) should be completed for all Hazard Category facilities 1, 2, and 3 nuclear facilities having a replacement cost greater than \$3 million and be reviewed every 3 years.

**Inspection Lines of Inquiry**

- Have key documents and records such as fire protection plans, fire emergency response procedures, fire Pre-Plans, design documents, safety analysis reports (SARs), technical safety requirements (TSRs), and FHAs been implemented, updated, and approved?
- Is Compliance Schedule Approval (CSA) documentation approved and linked to facility basis documents?
- Have FHA's been completed by a qualified fire protection engineer and updated as required?

**Inspection Criteria**

A comprehensive fire protection assessment program has been implemented including annual assessments for facilities valued in excess of \$100 million; or classified as Hazard Category 1 and 2 facilities, tri-annual assessments for facilities valued between \$50-100 million that are non-Hazard Category 1 or 2 and five year assessments for facilities valued between \$3-50 million. Facility self-assessments should be completed every 3 years (Ref. 10CFR830 and DOE Standard 1027-92).

**Inspection Lines of Inquiry**

- Have facility fire protection assessments for nuclear facilities been performed at required frequencies?

**Inspection Criteria**

A “baseline” needs assessment (BNA) of the fire protection emergency response organization has been documented and updated every 3 years. The plan should describe in sufficient detail fire fighting operations for the respective facilities.

***Inspection Lines of Inquiry***

- Do baseline needs assessments specify minimum fire department staffing, apparatus, equipment and procedures, and are these requirements consistent with the Emergency Plan?
- Do emergency response procedures include pre-fire strategies and standard operating for both fire fighting and HAZMAT rescue operations?
- Do facility pre-plans accurately reflect fire department BNA staffing?

**Physical Features of the Program**

Facilities shall be provided with complete fire rated construction and barriers commensurate with applicable fire codes to isolate hazardous areas and minimize the potential spread of fire and building loss. Automatic fire extinguishing systems should be installed in nuclear facilities and all operational areas that have the potential for loss of safety systems, pose significant life safety hazards to workers, unacceptable program and business interruption or fire loss potential for new buildings in excess of \$3 million. The DOE facilities are provided with a protection to achieve “defense-in-depth” and characterized by the best protected class of industrial risk (“Highly Protected Risk” or “Improve Risk”).

**Inspection Criteria**

- Existing buildings having a Maximum Possible Fire Loss in excess of \$10 million unless justified by an exemption/equivalency.
- New buildings having a MPFL in excess of \$3 million and/or 5000 square feet.
- Redundant fire protection systems in areas where the MPFP exceeds \$50 million, assuming the loss of either single fire protection system.

**Inspection Lines of Inquiry**

- Do Fire Hazard Analysis documents establish values for MPFL and associated physical fire protection systems and controls?
- Are redundant fire protection systems provided when required?
- Do fire rated walls meet the requirements of NFPA 221, Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls?

**Inspection Criteria**

A means is provided to prevent the accidental release of significant quantities of contaminated products of combustion and fire fighting water to the environment such as ventilation control, filter system, curbs and dikes. These controls should be identified as required in the FHA/DSA.

**Inspection Lines of Inquiry**

- Are controls established in fire department pre-plans to reduce the potential for release due to fire fighting operations?
- Are physical controls such as dikes and curbs provided where needed?
- Does the FHA/DSA specify adequate mitigation strategies including isolation, segregation, or special fire control systems?

**Inspection Criteria**

A redundant fire system should be considered for safety class systems and equipment that are vulnerable to fire damage.

**Inspection Lines of Inquiry**

- Have facilities and modification have constructed to meet the fire protection codes and standards in effect when a facility design criteria is approved, otherwise known as the Code of Record (COR) remain in effect for the life of the facility.
- Are other provisions (i.e., updated codes and standards) applied to existing facilities when a construction modification takes place or when a potential for immediate risk to life safety or health has been identified through either the facility assessment or FHA review process, or during the construction review or permitting process?
- Does the facility fire protection engineer have an adequate level of knowledge of safety class fire systems in his assigned facility?

**Inspection Criteria**

New and permanent facilities exceeding 5000 square feet shall be noncombustible, limited combustible, or fire-resistive construction materials.

**Inspection Lines of Inquiry**

- Does the construction classification specified in the fire hazard analysis meet the limitations established by DOE 420.1B and NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials?

**Inspection Criteria**

A means shall be provided to notify occupants and emergency responders of a fire.

**Inspection Lines of Inquiry**

- When fire alarm conditions occur, is there an automatic means of notification of facility occupants and emergency responders in accordance with NFPA 72, National Fire Alarm Code?



**Inspection Criteria**

Emergency egress shall be provided for all occupants in accordance with the Life Safety Code, NFPA 101.

**Inspection Lines of Inquiry**

- Is access to emergency egress paths unobstructed and designated exits are not blocked?
- Are life safety requirements for the specific occupancies met for travel distance, dead ends and common path of travel?

**Administrative Features**

Fire protection requirements have been documented to describe a comprehensive fire protection program sufficient to minimize the potential of the occurrence of fire or related event.

**Inspection Criteria**

Proper controls are incorporated to prioritize and monitor the status of the fire protection assessments and associated findings until final resolution.

**Inspection Lines of Inquiry**

- Have corrective actions for previously identified fire protection deficiencies been completed and were they effective?
- Have fire protection deficiencies been prioritized? For example, the level of risk for life safety deficiencies versus property protection.

**Inspection Criteria**

Verify requirements for Fire Watcher to include the responsibility for the welder in addition to that of the facility.

**Inspection Lines of Inquiry**

- Are the roles and responsibilities for the welder, fire watch, and facility management clearly defined in hot work procedures?

**References:**

10 CFR 851 Worker Safety and Health Program  
DOE Order 420.1B Facility Safety  
Implementation guides 420.1 and 440.1 Fire Safety Program  
DOE Standard 1088-95 Fire Protection for Relocatable Structures  
National Fire Protection Codes and Standards